Developing an innovative pump fishway: initial results, experience and the way forward

John Harris, Lee Baumgartner, Bob Keller, Brent Mefford and Guy Westbrook

Sponsors: MDBC, NSW DPI (Fisheries), Council of Freshwater Anglers

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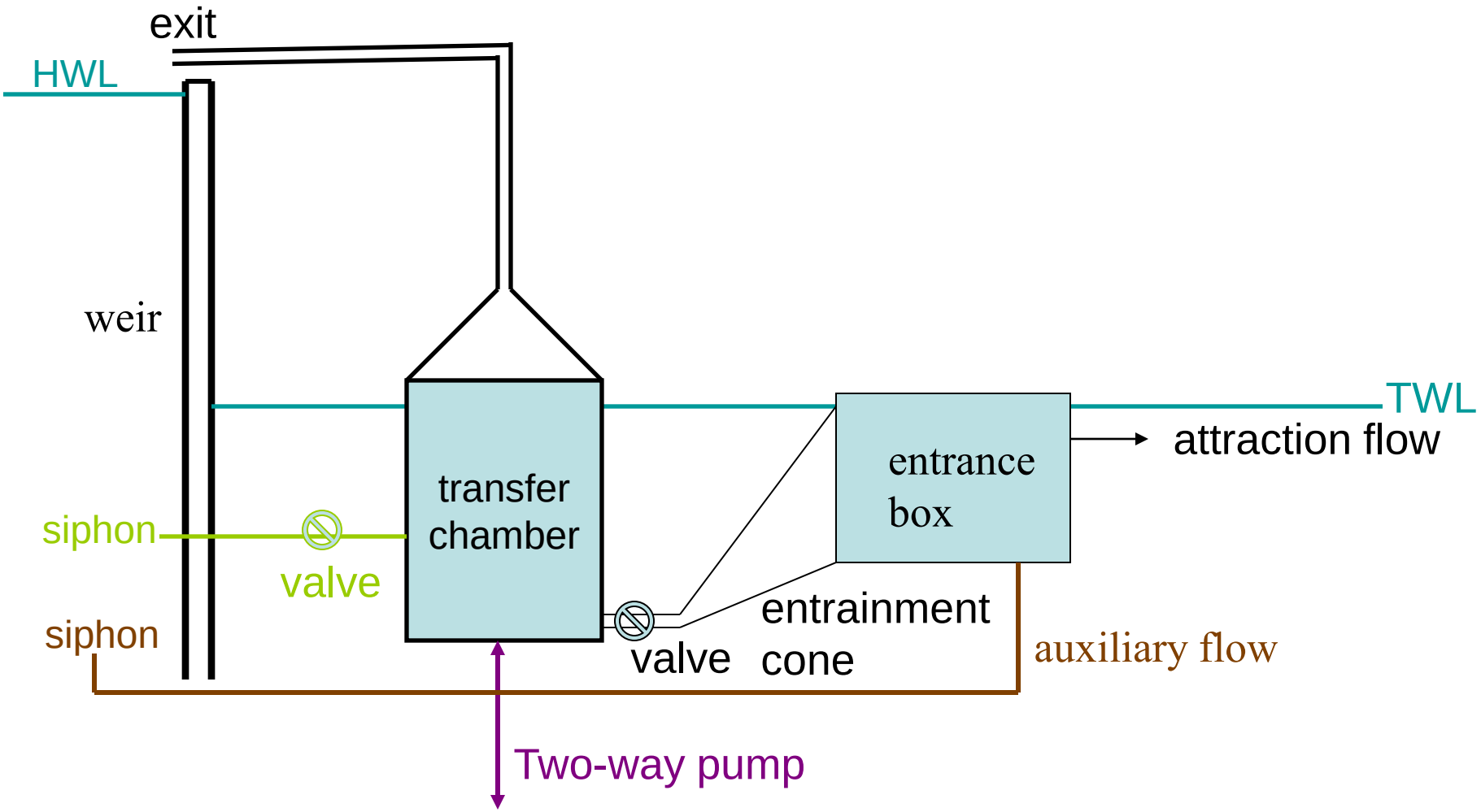
Project objectives:

* help rehabilitate native fish
* develop low-cost, effective, flexible fishways
* combine diverse fisheries technologies
* build and test a prototype pump fishway

Prototype pump fishway schematic



First and second prototype trials at Yanco Weir:

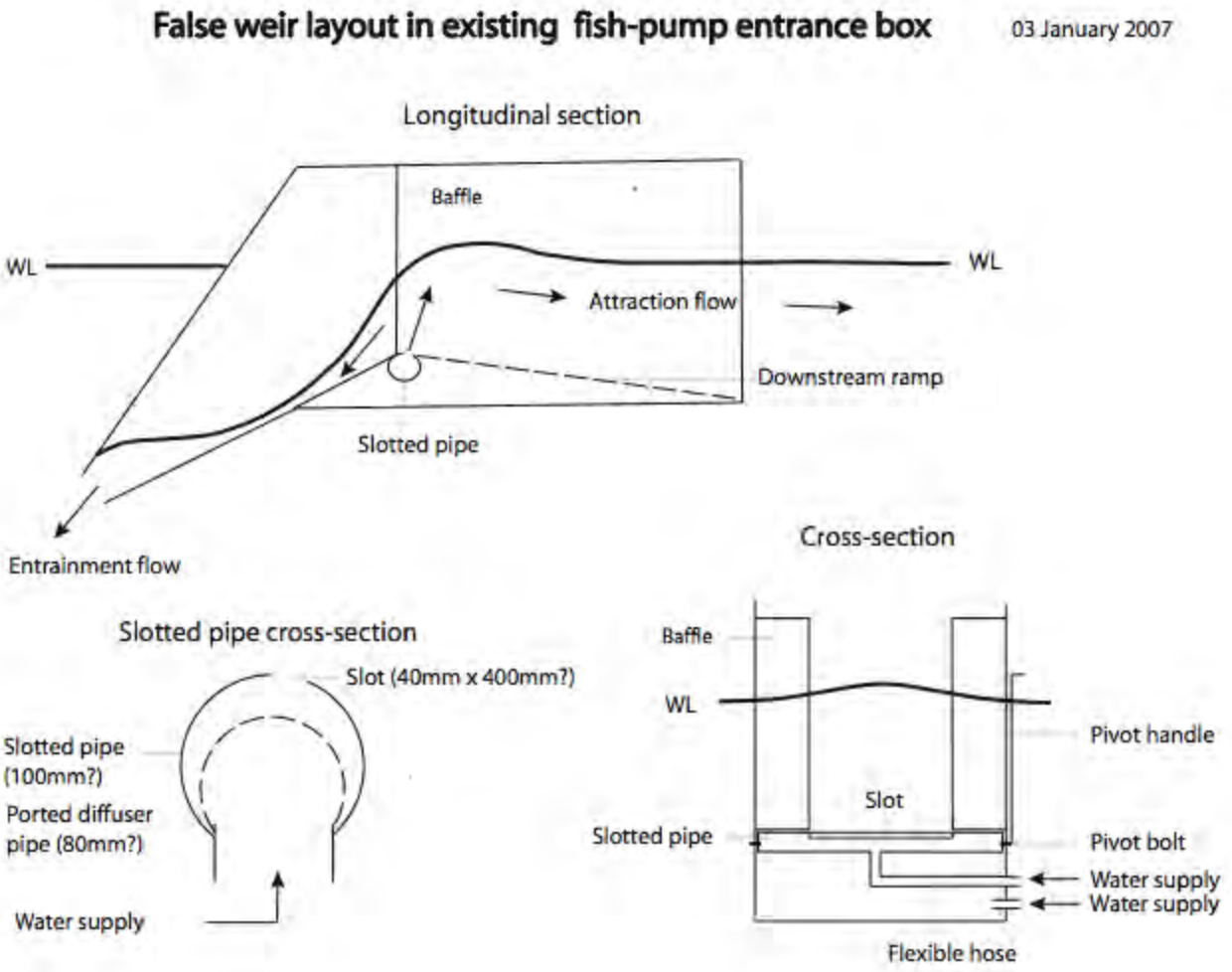
* October 2005 - flooding, loss of access, postponement

* March 2006 - few fish migrating, useful hydraulics experience, ran transfer trials

Third trials - Narrandera Fisheries Centre

* pond stocked with 5 native species, 36mm - 472mm
* ran trials to test attraction, entrainment and transfer
* data from holding net, PIT tags and DIDSON equipment
* flow from bank of portable pumps including 100mm trailer-mounted diesel
* modified entrance and trapping conditions with vertical slot and false weir

Flow separation and fish trapping with the false weir



Results of standard trials (n=9)

Table 1. *Results of standard trials of the prototype pump fishway. Most fish were small* Hypseleotris *spp. gudgeons (average length 36.4mm). Larger fish (>150mm) included Murray cod (MC), golden perch (GP) and silver perch (SP). Healthy fish were those with no visible injuries and swimming normally when released.*

Trial number	Total fish	Large fish*	Healthy %
1	5	_	40
2	2	_	100
3	12	_	17
4	8	_	75
5	6	_	83
6	6	_	100
7	5	1 GP	40
8	7	2 MC	71
9	1	1 SP	100
Total	52	4	70

Entrainment and transfer trials (n=4)

Table 2. *Combined results of four entrainment and transfer trials, with numbers of fish successfully entrained from the entrance box into the transfer chamber, transferred from the chamber to the exit or both entrained and transferred.*

Species*	Total fish	Entrained	Transferred	Entrained & transferred
MC juv.	20	n/a	12	2
GP juv	20	n/a	9	6
MC lge	7	0	0	0
GP lge	3	1	0	0
SP lge	2	2	0	0

* MC - Murray cod, GP - golden perch, SP - silver perch, juv - juvenile, lge - >150mm, n/a - not assessed.

Conclusions and experience from first-stage trials:

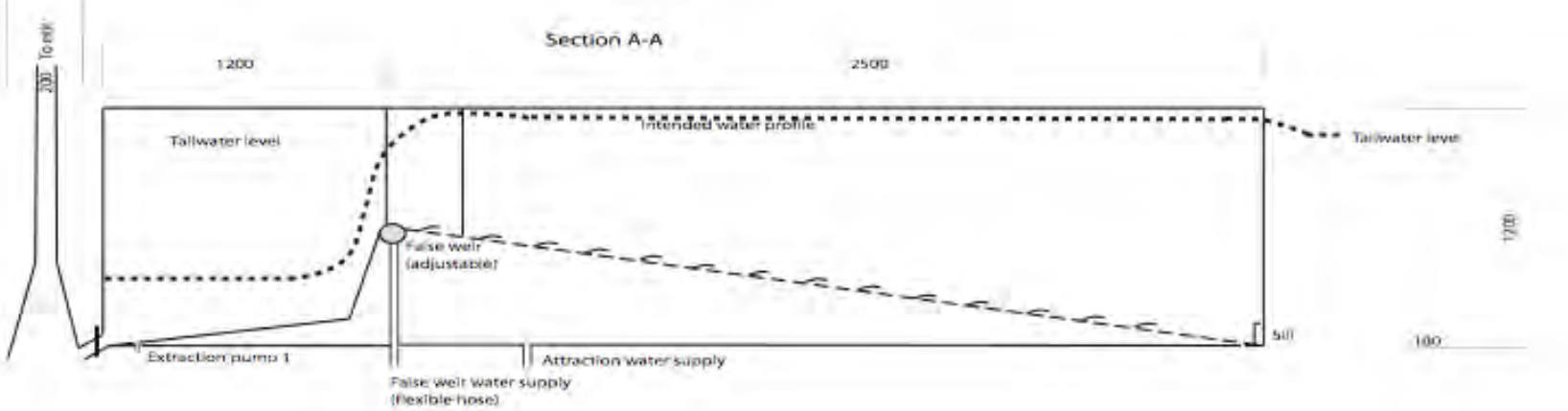
* limited data, excessive injuries, but basic principles appear sound
* small numbers of large and small fish were attracted, entrained and transferred
* valuable experience with hydraulics and fish behaviour in new system

$ $ $ practical problems highlight need for adequate resources

* false weir design can attract/trap small and large fish - promising system
* Essential to have much greater attraction flows - siphon from reservoir
* Need to overcome large fish remaining on bottom of transfer chamber

What's needed to develop the concept for practical application?

* attracting fish effectively into the entrance
* trapping fish in an enclosure
* entraining fish in a pressurised system
* transferring all fish uninjured to the exit



Practical, simplified solutions are devised for each of these requirements

? *Attracting fish effectively into the entrance*

√ Gravitated & piped attraction flows, vertical slot, flow-directing vanes

? *Trapping fish in an enclosure?*

√ False weir (vertical-slot series if unsuccessful)

? *Entraining fish in a pressurised system?*

√ Knife valve and sluice pipe to transfer chamber

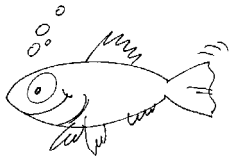
? *Transferring all fish uninjured to the exit?*

√ Gravitated flow from reservoir into narrow vertical transfer chamber, thence over crest by airlift pump

The way forward:

* Test hydraulics of false weir in a scale model

* Find sponsor for second-stage trials at suitable riverine site



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